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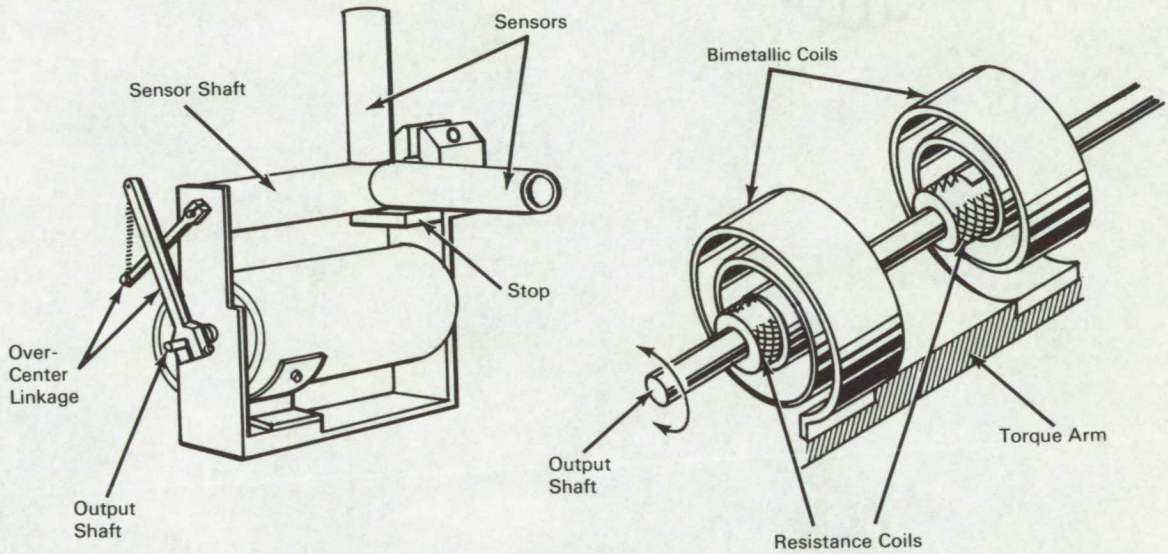
NASA TECH BRIEF

Thermal Motor Positions Magnetometer Sensors



The problem:

In checking magnetometer sensors for zero offset, it is necessary to change their orientation frequently and on command. It is necessary that the mechanism used develop minimum magnetic field.

The solution:

A reversing, thermal, motor-driven device that alternately positions two magnetometer sensors at fixed positions 90° apart. The thermal motor is fabricated completely of nonmagnetic materials.

How it's done:

Two bimetallic coils are mounted oppositely on a common shaft made of solid and hollow sections. The hollow sections contain counterwound, double threaded resistance coils that generate no magnetic field. The bimetallic coils are mounted on these hollow sections with their external ends anchored to a torque arm. The motor output shaft is attached to a spring-loaded, over-center linkage that engages the sensor shaft above the motor.

Heating of one resistance element causes its bimetallic coil to drive the output shaft in a clockwise direction to a point where the over-center linkage flips the sensor shaft through a 90° turn. When that resistance element has cooled, current applied to the other heater results in a reversal and the sensors are rotated 90° in a counterclockwise direction to their original position. Torque from one bimetallic coil is transmitted to the other through the torque arm, so that no energy is expended in overcoming spring resistance in the dormant coil, as the case would be if each coil were independently enclosed. A stop provides

(continued overleaf)

positive positioning of the sensors in each cycle at 90° from their previous position.

Notes:

1. Ambient temperature gradients have no effect because the two bimetallic coils act in opposition, thus cancelling mutual contraction or expansion.
2. Energy of approximately 300 watt seconds is required to rotate the sensors. Transit time is approximately 0.2 second.
3. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Ames Research Center
   Moffett Field, California, 94035
   Reference: B66-10078

Patent status:

This invention is owned by NASA, and a patent application has been filed. Royalty-free, non-exclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C., 20546.

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